NORTH PACIFIC OCEAN

By WILLIS E. HURD

The Aleutian LOW, having in February dominated the weather of the North Pacific far down into middle latitudes, receded northward at the close of that month, and practically throughout March hung over the higher latitudes, being central most of the time over the northwestern part of the Gulf of Alaska. At the same time, the North Pacific HIGH largely covered middle latitudes, having regained the position it lost in February. As a result of these pronounced changes in pressure distribution gales moderated considerably in force and frequency over the entire upper reaches of the ocean east of the one hundred and eightieth meridian, where storminess was much less than during any previous month since November.

The pressure at Dutch Harbor underwent a remarkable change. Its average reading for February was 29.19 inches, which is the lowest in recent years. In March it rose to 29.85 inches, which is the highest reading for the month during a similar period. At St. Paul the pressure in March was more than one-quarter inch above the normal, while at Kodiak, the center of lowest pressure this month, it was nearly as much below, thus establishing a remarkable pressure gradient over Bering Sea.

The following table illustrates the pressure conditions at various stations in west longitudes:

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean, March, 1927*

Station	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Dutch Harbor [1]	29.85	+0.11	30.34	16th [4]	29.38	4th. [5]
St. Paul [1]	30.03	+0.28	30.52	16th	29.38	22d.
Kodiak [1]	29.52	−0.23	30.36	30th	28.86	11th.
Midway Island [1] [4]	30.15	+0.07	30.28	10th [5]	29.90	8th.
Honolulu [2]	30.04	0.00	30.19	1st	29.79	28th.
Juneau [2]	29.75	−0.19	30.26	22d	28.94	7th.
Tatoosh Island [2] [3]	30.06	+0.08	30.52	22d	29.48	30th.
San Francisco [2] [3]	30.08	+0.03	30.31	15th	29.78	9th.
San Diego [2] [3]	30.04	+0.02	30.20	12th	29.76	10th.

[1] P. m. observations only.
[2] A. m. and p. m. observations.
[3] Corrected to 24-hour mean.
[4] 30 days.
[5] And on other dates.

The atmospheric pressure in the Far East was much like that of February, except that the continental HIGH showed distinct evidences of breaking up with the approach of spring, in that an increasing number of cyclones and depressions had origin over eastern China or off the immediate coast. No less than five storms, three of which may be characterized as of major importance, moved out of this area.

The storm of the 2d to 6th formed east of Taiwan, moved northeastward, and disappeared a few hundred miles east of central Japan. On the 4th and 5th it caused gales over a considerable stretch of sea southeast of Honshu, culminating in a northwest hurricane on the 5th, as reported by the American steamer *Memphis City*, which rode out the full force of the storm during the afternoon, minimum pressure 29.17 inches. This storm will be classed undoubtedly as a typhoon.

The four succeeding storms were of continental origin, having nearly the same source over eastern or central China. That of the 7th to 14th moved rapidly seaward and crossed the Japan Sea during the 8th and 9th, causing moderate to strong gales along most of the eastern and western coasts of the archipelago. From the 10th to 12th it moved northeastward across the Okhotsk Sea to Kamchatka, crossed the intervening space to the western Aleutians during the 13th, and joined with the Aleutian LOW over the Gulf of Alaska on the following day. A secondary to this cyclone caused violent gales southeast of Honshu early on the 11th.

A disturbance of briefer existence left China on the 11th and disappeared at sea in middle latitudes on the 14th, after causing some rough weather over the Eastern Sea and the south coast waters of Japan.

The storm that cleared the continent on the 18th moved along the southern coast of Japan on the two following days. On the 20th it rapidly gained in energy, and on the 21st caused hurricane winds over a considerable area central near 43° N., 159° E. On the 22d, continuing violent, it crossed to the western Aleutians, with whole gales to storm winds blowing along its southern quadrants. It crossed Bering Sea on the 23d, and died out over the northeastern part of the Gulf of Alaska on the 24th.

The last Chinese storm of the month left the continent on the 22d, and became violent east of Japan on the 27th, on which date the *West Calera* encountered a northwest hurricane in 37° 13′ N., 147° E. Thereafter the storm diminished and disappeared, apparently in the Aleutian area.

No gales exceeding force 10 were reported from the sea in west longitudes. The moderate to strong gales that did occur over this vast region were mostly encountered along the upper steamship routes. At points on the Washington coast there were heavy gales early in the month, the Weather Bureau station at Tatoosh Island reporting a 64-mile wind from the southwest on the 1st, and a 65-mile wind from the south on the 5th, while the station at North Head had a 63-mile wind from the south on the 7th. At Juneau, Alaska, the maximum wind velocity was at the rate of only 32 miles an hour, yet the average hourly velocity, 9.7 miles, showed the highest wind movement on record here for March.

The weather in southern latitudes was quiet for the most part. A norther of force 9 occurred in the Gulf of Tehuantepec on the 3d, and strong winds to moderate gales were experienced by the British steamer *Wairuna* from the 6th to the 9th between the Equator and the Hawaiian Islands. These were easterly as a rule and were unaccompanied by pressure changes.

At Honolulu the maximum wind velocity was 35 miles from the northwest on the 22d. The average hourly velocity was 9.8 miles, and the prevailing direction from the east. The total rainfall was 6.67 inches, which is 0.47 inch above the normal. Of this amount 3.94 inches fell within 24 hours on the 22d and 23d. The first hail ever recorded by the Weather Bureau at Honolulu since its establishment in 1904 fell here during a thunderstorm on the 23d.

Fog diminished along the American coast since February, but increased somewhat over the open ocean to the westward. The principal fog area lay between 35° and 50° N., 130° and 170° W., where it was observed scatteringly on 13 days. There were three days with fog northwest of Midway Island, and a few days with it east of Japan. On the 21st the American steamer *China Arrow* had dense fog from 8.30 a. m. until 2.30 p. m., following upon heavy rains near 43° N., 157° E. When the fog cleared it was followed by more rain and by increasing winds which terminated in hurricane velocities late in the evening. Fog occurred south of Hongkong on the 7th to 9th, and was reported up the coast on the

12th. March is the month of most frequent fogs in lower Chinese waters.

On the 24th the American steamer *West Holbrook*, in 42° 15′ N., 144° 56′ E., reported "ice floes in great quantities, but of small size. Temperature of sea and air, 30°."

A MADAGASCAR CYCLONE

The Weather Bureau has no reports as yet concerning the tropical cyclone in the Indian Ocean which struck Madagascar on March 1, other than those furnished to the press, which state that a terrific storm devastated the port of Tamatave on that day. The harbor was wrecked and all steam and sailing vessels within it were destroyed, while several hundred lives were reported lost. A tidal wave added to the destruction within the city, and caused great losses along many miles of the coast. Wireless messages from vessels told of the intensity of the storm at sea. The island of Reunion was later reported as swept by the cyclone.—*W. E. H.*

CLIMATOLOGICAL TABLES[1]

CONDENSED CLIMATOLOGICAL SUMMARY

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Condensed climatological summary of temperature and precipitation by sections, March, 1927

Section	Temperature								Precipitation					
			Monthly extremes								Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	57.0	+0.9	Ozark	89	18	Valley Head	19	[2]3	4.89	−0.86	Riverton	9.75	Alaga	0.97
Arizona	52.3	−0.7	Quartzsite	98	25	Fort Valley	−1	12	1.15	−0.01	Natural Bridge	3.31	Bowie	0.07
Arkansas	53.5	+0.8	3 stations	87	[2]19	Dutton	5	3	7.24	+2.50	Yancopin	15.70	Magnolia	2.65
California	50.4	−1.2	Amos	100	27	Helm Creek	−13	10	2.62	−1.18	Crescent City	10.25	Greenland Ranch	0.00
Colorado	32.6	−1.8	2 stations	78	[2]8	Hermit	−36	20	1.82	+0.53	La Veta Pass	6.42	Blanca	0.10
Florida	65.7	0.0	Brooksville	91	[2]16	Vernon	26	[2]3	2.38	−0.52	Bluff Springs	5.16	Miami Beach	0.54
Georgia	58.2	+1.5	Alapaha	91	18	Blue Ridge	14	3	3.15	−1.64	Clayton	6.32	Bainbridge	1.01
Idaho	35.9	+0.1	Orofino	79	30	Stanley	−19	16	1.22	−0.29	Roland	4.07	Geneva	0.20
Illinois	44.4	+3.8	Harrisburg	78	19	Mount Carroll	10	3	4.60	+1.39	Cairo	8.07	Rockford	1.55
Indiana	44.0	+3.3	Marengo	78	19	2 stations	12	[2]2	4.69	+0.83	Rome	9.96	Notre Dame	2.02
Iowa	39.6	+4.9	Tipton	75	16	Inwood	0	21	1.92	+0.17	Fairfield	3.64	West Bend	0.62
Kansas	43.2	−0.4	3 stations	80	15	2 stations	−7	1	2.84	+1.44	Pleasanton	10.09	Ulysses	0.51
Kentucky	48.4	+2.0	Williamsburg	82	20	3 stations	10	3	6.04	+1.20	Murray	12.71	Hazard	2.36
Louisiana	61.1	+0.4	3 stations	87	[2]19	2 stations	26	[2]3	7.39	+2.72	Monroe	12.40	Burrwood	3.16
Maryland-Delaware	45.4	+2.8	Hancock, Md	84	17	2 stations	10	4	1.75	−1.91	Grantsville, Md	3.19	Ferry Landing, Md.	1.21
Michigan	35.7	+6.0	3 stations	73	[2]16	2 stations	−22	[2]1	2.00	−0.18	Benzonia	3.62	Iron River (near)	0.21
Minnesota	31.9	+5.8	Waseca	80	[2]13	Itasca State Park	−22	2	1.52	+0.36	New Ulm	3.82	Hallock	0.21
Mississippi	57.3	+0.6	3 stations	87	19	Monticello	21	4	8.27	+2.77	Austin	12.89	Shubuta	3.79
Missouri	45.9	+2.1	Marshall	80	16	Hollister	0	3	5.87	+2.87	Bolivar	11.24	Downing	1.69
Montana	32.9	+2.7	Foster	75	14	Hebgen Dam	−18	20	0.61	−0.30	Adel	2.49	Livingston	T.
Nebraska	36.8	+1.2	Syracuse	77	15	Madrid	−16	1	2.57	+1.47	Albion	4.97	Fort Robinson	0.90
Nevada	41.7	−0.1	Las Vegas	88	25	Owyhee	−1	19	0.84	+0.03	Tuscarora	2.12	Mina	T.
New England	35.6	+3.4	Waterbury, Conn	75	17	Pittsburgh (a), N.H.	−19	2	1.49	−1.76	Somerset, Vt	2.75	Milo, Me	0.33
New Jersey	41.9	+3.3	2 stations	81	18	Layton	9	2	1.46	−2.43	Indian Mills	2.73	New Brunswick	0.78
New Mexico	43.4	+0.1	Jal	88	27	Elizabethtown	−21	21	0.71	−0.14	Cloverdale	6.42	8 stations	0.00
New York	36.2	+4.2	Dansville	80	17	North Lake	−18	2	1.98	−1.08	High Market	3.54	Chazy	0.41
North Carolina	51.4	+1.1	3 stations	88	[2]17	Rockingham	7	5	3.41	−0.97	Mount Mitchell	8.09	Terra Ceia	1.03
North Dakota	30.4	+7.8	Carson	77	14	McKinney	−10	2	0.74	−0.09	Fullerton	2.26	Pembina	0.00
Ohio	42.7	+3.1	Portsmouth	81	16	Norwalk	9	4	3.83	+0.33	Miamisburg	5.82	Put in Bay	1.87
Oklahoma	50.7	−1.4	2 stations	86	[2]7	2 stations	−1	1	2.62	+0.53	Hugo	7.26	Elk City	T.
Oregon	41.7	−0.5	Pilot Rock	75	30	Lake	7	5	2.77	−0.36	Willow Creek	10.07	Riley	0.26
Pennsylvania	42.0	+4.5	Hyndman	82	17	West Bingham	−6	2	2.61	−0.93	Creekside	5.43	Doylestown	0.69
South Carolina	55.2	+0.4	Camden	89	20	Spartanburg	16	3	3.79	−0.11	Caesars Head	6.15	Yemassee	2.18
South Dakota	34.9	+4.0	Hopewell	77	14	Menno	−12	21	1.26	+0.21	Canton	3.18	2 stations	T.
Tennessee	51.1	+1.7	Etowah	86	19	Rugby	3	3	7.49	+2.18	Brownsville	13.66	Bristol	2.84
Texas	58.7	0.0	Falfurrias	104	31	Dalhart	−1	[2]1	2.33	+0.27	Groveton	9.70	3 stations	0.00
Utah	38.3	+0.4	Hanksville	82	27	Woodruff	−14	10	1.73	+0.25	Silver Lake	4.47	Fort Duchesne	T.
Virginia	48.2	+2.2	Woodstock	89	18	Burkes Garden	0	4	1.86	−1.96	Emory	4.17	Dale Enterprise	0.65
Washington	40.4	−0.1	La Center	70	[2]23	Lake Keechelus	4	[2]9	2.89	−0.41	Heather Meadows	14.93	Naches Heights	0.06
West Virginia	45.4	+2.4	Valley Chapel	89	18	Pickens	5	1	2.66	−1.24	Pickens	4.97	Upper Tract	0.20
Wisconsin	35.1	+6.1	Fond du Lac	76	16	Mellen	−22	1	2.10	+0.38	Plum Island	4.82	Florence	0.40
Wyoming	29.6	−0.3	2 stations	70	[2]14	Riverside	−29	20	1.21	+0.19	Dome Lake	4.40	Powell	0.02
Alaska (February)	23.4	+3.9	Annex Creek	58	22	Eagle	−51	17	5.88	+0.70	Latouche	28.61	McKinley Park	0.11
Hawaii	70.7	+1.9	2 stations	90	[2]24	Waimea	45	26	10.55	+1.67	Honokohau Ridge	61.00	Kaanapali	0.47
Porto Rico	73.8	0.0	2 stations	94	[2]15	Cayey	48	8	7.24	+3.70	Jayuya	18.65	Santa Isabel	0.10

[1] For description of tables and charts, see REVIEW, January, p. 43.

[2] Other dates also.